

Appl. No. 09/919,994
Amdt. dated September 10, 2004
Reply to Office Action of June 10, 2004

REMARKS/ARGUMENTS

Reconsideration of this application is respectfully requested.

Claims 1-5, 7-12, and 14-31 are pending in the application, with claims 6 and 13 having been canceled, claims 1-5, 7-9, 11, 12, and 27 having been amended, claims 14-26 and 28 having been withdrawn, and new claims 29-31 having been added.

The specification has been objected to as failing to provide proper antecedent basis for the claimed subject matter. According to the Examiner, "The subject matter of claims 3 and 8 lacks antecedence from the specification."

The specification has been amended on pages 7 and 11, as shown above, to incorporate the disclosure of claims 3 and 8 that appeared in the application as filed. Accordingly, it is requested that the objection be withdrawn.

The specification and claims have also been amended to delete "residual" from "the weight ratio of the inert solvent to the residual diphenylmethane diisocyanate monomer ranges from about 90:10 to about 10:90". It is clear from a perusal of the working examples, particularly Examples 1-10, that the ratio relates to the total diphenylmethane diisocyanate present at the time the inert solvent is added.

Claim 3 has been rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter Applicants regard as their invention. According to the Examiner, "It is unclear what esters are encompassed by the language, 'aromatic, aliphatic esters'."

Appl. No. 09/919,994
Amdt. dated September 10, 2004
Reply to Office Action of June 10, 2004

Claim 3 has been amended to change "organic aromatic, aliphatic esters, and mixtures thereof" to "organic aromatic esters, aliphatic esters, and mixtures thereof." That aromatic esters and aliphatic esters were contemplated is clear from the language of the specification on page 11, lines 15-17.

Claims 6-9, 13, and 27 have been rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter Applicants regard as their invention. According to the Examiner: "Applicants have failed to set forth the basis for the claimed percent content of the diphenylmethane diisocyanate monomer. Furthermore, applicants have failed to specify the type of percent (i.e.; weight or mole) for the free diphenylmethane diisocyanate of claim 13."

Claims 6-8, 13, and 27 and, indirectly, claim 9, have been amended to specify that the weight percent of unreacted diphenylmethane diisocyanate monomer is based on the combined weight of prepolymer and monomer. Claim 13 has been amended to specify that the percent is a weight percent.

Claims 1-4, 8, and 13 have been rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter Applicants regard as their invention. According to the Examiner: "The language; 'above about 200°C', 'up to about 150°C', 'at least about 80%', and 'no more than about 0.3%'; renders the claims indefinite, because it is unclear if the use of 'about' with 'above', 'up to', 'at least', and 'no more than' causes the language to encompass values above or below the recited value which otherwise would have been definitively limited by the aforementioned language if 'about' was

Appl. No. 09/919,994
Amdt. dated September 10, 2004
Reply to Office Action of June 10, 2004

not used."

The word "about" has been deleted at those points in the claims specified by the Examiner.

Accordingly, it is requested that the rejections under 35 U.S.C. 112, second paragraph, referred to above be withdrawn.

Claims 9, 11, and 12 have been rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. According to the Examiner: "The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Applicants have failed to specify the type of molecular weight (weight average or number average) or how it has been determined. This information is necessary for the proper identification of the polyols."

The claims have been amended to specify that the molecular weights of the high molecular weight polyols are number average molecular weights. Support for this amendment may be found in the specification on page 14, lines 3-4.

Accordingly, it is requested that the rejection under 35 U.S.C. 112, first paragraph, be withdrawn.

Claims 5-13 have been rejected under 35 U.S.C. 102(b) as being anticipated by Schnabel et al. (U.S. Patent No. 4,385,171).

Schnabel et al. disclose the removal of unreacted diisocyanate from a polyurethane prepolymer reaction product mixture by co-distillation of the unreacted diisocyanate with a compound which is at least partially miscible with the prepolymer and which boils at a temperature greater than the boiling point of the diisocyanate. It is said that a highly efficient removal rate is achieved in that the concentration of unreacted diisocyanate remaining in the reaction product mixture is generally less than about 0.1 percent, and in many cases less than about 0.05 percent, based on the weight of the prepolymer.

Claims 5-13 are all directed to a prepolymer that is a reaction product of *diphenylmethane diisocyanate* and one or more polyols. The use of diphenylmethane diisocyanate as one of the reactants is nowhere disclosed or suggested by Schnabel et al. Thus, Schnabel et al. do not anticipate the claimed invention. Accordingly, it is requested that the rejection of Claims 5-13 under 35 U.S.C. 102(b) as being anticipated by Schnabel et al. be withdrawn.

Claims 1-6 and 9-13 have been rejected under 35 U.S.C. 102(b) as being anticipated by Dunlap et al. (U.S. Patent No. 4,888,442).

Dunlap et al. disclose a process for reducing the free monomer content of polyisocyanate adduct mixtures wherein the adduct has an average isocyanate functionality of greater than about 1.8 which comprises treating the polyisocyanate adduct mixture in the presence of 2 to about 30 percent by weight of an inert solvent, based on the weight of the polyisocyanate mixture, in an agitated thin-layer evaporator under conditions sufficient to reduce the free monomer content of the polyisocyanate adduct mixture below that level which

Appl. No. 09/919,994
Amdt. dated September 10, 2004
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is obtainable in the absence of a solvent.

The Dunlap et al. process contemplates only adding the inert solvent to the polyisocyanate adduct mixture. Claims 6 and 13 of the present application have been canceled. The remaining present claims, as amended, are directed to a process wherein the diisocyanate is first dissolved in the inert solvent and then the polyurethane prepolymer reaction product is formed by reaction with one or more polyols. The step of dissolving the isocyanate in the inert solvent prior to reaction is nowhere disclosed or suggested by Dunlap et al.

Accordingly, it is requested that the rejection of Claims 1-6 and 9-13 under 35 U.S.C. 102(b) as being anticipated by Dunlap et al. be withdrawn.

Claims 1-13 have been rejected under 35 U.S.C. 102(b) as being anticipated by Rosenberg et al. (U.S. Patent No. 5,703,193).

Rosenberg et al. disclose a process for reducing the amount of residual organic diisocyanate monomer in a polyurethane prepolymer reaction product mixture which comprises distilling the polyurethane prepolymer reaction product mixture in the presence of a combination of *at least one inert first solvent with a boiling point below the boiling point of the residual organic diisocyanate monomer and at least one inert second solvent with a boiling point above the boiling point of the residual organic diisocyanate monomer*, at a temperature which exceeds the vaporization temperature of the residual organic diisocyanate monomer and which is below the decomposition temperature of the polyurethane prepolymer.

Appl. No. 09/919,994
Amdt. dated September 10, 2004
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The Rosenberg process requires at least two inert solvents, one having a boiling point above the boiling point of the diisocyanate and the other having a boiling point below the boiling point of the diisocyanate. The claims of the present application have been amended to require that the inert solvent or solvents employed in the practice of the present invention *all* have boiling points *below* the boiling point of the diisocyanate, i.e., "said solvent being exclusively selected from the group consisting of solvents having a boiling point about 1°C to about 100°C below the boiling point of the diphenylmethane diisocyanate monomer at a pressure of 10 torr."

Rosenberg et al. nowhere disclose or suggest any benefit deriving from the use of anything other than a combination of high and low boiling solvents and, in fact, show in Comparative Example G the unsuccessful removal of free PPDl monomer with low-boiling solvent, thereby leading away from the present invention.

Accordingly, it is requested that the rejection of Claims 1-13 under 35 U.S.C. 102(b) as being anticipated by Rosenberg et al. be withdrawn.

Claim 27 has been rejected under 35 U.S.C. 103(a) as being unpatentable over Schnabel et al. or Dunlap et al. or Rosenberg et al., each in view of Rizk et al. (U.S. Patent No. 4,624,996) or Lander (U.S. Patent No. 4,101,473).

The disclosures of Schnabel et al., Dunlap et al., and Rosenberg et al. have been described above.

Rizk et al. disclose a heat curable one package polyurethane resin composition said to be adaptable to use for automotive seam sealing, particularly under high solids acrylic enamel paints, the composition comprising an isocyanate terminated polyurethane prepolymer the isocyanate groups of which are blocked by reaction with an oxime, and a curing agent having at least two active hydrogen atoms per molecule, such as a polyol, a polyamine, or a blocked polyamine.

Lander discloses solid particle-form, polymerizable or cross-linkable, multi-functional polymeric material containing blocked isocyanate groups wherein the blocked isocyanate groups making up the polymeric material comprise only a portion of the total isocyanate groups to produce the polymeric material, such as extrudable, thermosettable powdered blocked polyurethane (PBP). The polymeric material, such as PBP, may be manufactured by reacting a liquid reaction admixture comprising a partially blocked polyurethane prepolymer with a chain extending reactant under conditions such that the reaction admixture is reacted in dispersed form with the result that the reaction product is recoverable in solid particle-form as the PBP.

Neither Rizk et al. nor Lander supplement the deficiencies of the cited primary references discussed above. Both references simply show that it is known in the art to use reversible blocking agents, such as ketoximes, phenols, lactams, dimethylpyrazole and the like, to block the isocyanate end groups of isocyanate/polyol prepolymers. This has been admitted by the Applicants on page 60 of the application at lines 3-5. However, it was not known in

Appl. No. 09/919,994
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the art to block the low residual MDI prepolymers of the present invention in this way. It has been shown in Example 38 and Comparative Example S that unexpected results are obtained, e.g., higher tear strength and lower tangent delta values, when blocked prepolymers of the present invention are employed than when a comparably blocked TDI prepolymer is used. See Table 7 on page 62.

Claim 27 has been amended in a manner similar to that used in Claim 5 above. The Examiner has stated: "Product by process claims are examined as product claims. The process limitations are given patentable weight only if it has been established that the process causes the product to have different properties from the prior art product." It is respectfully submitted that in the present invention the process does, in fact, cause the product to have different properties from the prior art product. None of the cited art discloses how a prepolymer based upon MDI can be obtained having a residual MDI content of less than 0.3%, nor does it disclose how a polyurethane could be prepared having the properties shown in Table 7. It is necessary that the steps employed to form the prepolymer be included in the claim in order to distinguish the novel prepolymer of the present invention from those known in art, which have inferior properties.

Accordingly, it is requested that the rejection of claim 27 under 35 U.S.C. 103(a) as being unpatentable over Schnabel et al. or Dunlap et al. or Rosenberg et al., each in view of Rizk et al. or Lander be withdrawn.

Appl. No. 09/919,994
Amdt. dated September 10, 2004
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In view of the foregoing, it is submitted that this application is now in condition for allowance and an early Office Action to that end is earnestly solicited.

Respectfully submitted,

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Date

Paul J. Lewis Reg. No. 30,754
for James L. Lewis
Reg. No. 24,732

Levy & Grandinetti
Suite 1108
1725 K Street, N.W.
Washington, D.C. 20006-1423

(202) 429-4560